PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION See Form PCT/IPEA/416	
116484 USN		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/SE2003/000960	11-06-2003	
International Patent Classification (IPC) or national classification and IPC		
H02M3/156		
Applicant		
Telefonaktiebolaget LM Ericsson (publ) et al		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 4 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☐ *(sent to the applicant and to the International Bureau)* a total of _____ sheets, as follows:
      ☐ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s))
      _____, containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).
4. This report contains indications relating to the following items:
   - ☒ Box No. I Basis of the report
   - ☐ Box No. II Priority
   - ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - ☐ Box No. IV Lack of unity of invention
   - ☒ Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - ☐ Box No. VI Certain documents cited
   - ☐ Box No. VII Certain defects in the international application
   - ☐ Box No. VIII Certain observations on the international application

Date of submission of the demand	Date of completion of this report
10-01-2005	01-09-2005
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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/SE2003/000960

Box No. I Basis of the report

1. With regard to the language, this report is based on:

☒ the international application in the language in which it was filed

☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of:

- ☐ international search (Rules 12.3(a) and 23.1(b))
- ☐ publication of the international application (Rule 12.4(a))
- ☐ international preliminary examination (Rules 55.2(a) and/or 55.3(a))

2. With regard to the elements of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):*

☒ the international application as originally filed/furnished

☐ the description:

pages _____ as originally filed/furnished
pages* _____ received by this Authority on _____
pages* _____ received by this Authority on _____

☐ the claims:

pages _____ as originally filed/furnished
pages* _____ as amended (together with any statement) under Article 19
pages* _____ received by this Authority on _____
pages* _____ received by this Authority on _____

☐ the drawings:

pages _____ as originally filed/furnished
pages* _____ received by this Authority on _____
pages* _____ received by this Authority on _____

☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing *(specify)*: _____
- ☐ any table(s) related to the sequence listing *(specify)*: _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing *(specify)*: _____
- ☐ any table(s) related to the sequence listing *(specify)*: _____

* *If item 4 applies, some or all of those sheets may be marked "superseded."*

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/SE2003/000960

Box No. V **Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims		YES
	Claims	1-3	NO
Inventive step (IS)	Claims		YES
	Claims	1-3	NO
Industrial applicability (IA)	Claims	1-3	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

The object of the present invention resides in providing a device which can convert a first DC-voltage level to a second DC-voltage level, with the device being able to handle rather high power levels and delivering a stable output voltage regardless of variations in the load connected to the device, while at the same time occupying a minimal amount of space.

The solution of the object is based on creating a device comprising at least a first and a second DC-DC-converter, with each converter having respective input and output voltages, and respective input and output currents, each converter converting an input DC-voltage level to an output DC-voltage level, with each converter also comprising input means for a control signal. The device additionally comprises a control means common to the first and second converters and arranged to detect a first output voltage at a point in the device which is a common point for the output voltages of first and second converters, with the control means delivering a common control signal to the input means of each converter, wherein said common control signal being varied according to the level of the voltage at said common point.

The following documents are cited in the International Search Report:

D1) US 6009000 A
D2) US 5724237 A
D3) US 6038154 A
D4) US 6351108 B1

.../...

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of: Box V

Document D1 shows a power system consisting of parallel connected current-mode power converters combined with a voltage error signal on a shared-bus used in common for controlling all of the power stages for improved consistency, reliability and performance in both transient and steady states. Near uniform current sharing is achievable without sacrificing the voltage regulation performance. The improved system offers faster settling time under step loads. Consistent small signal characteristics and large signal responses regardless of mismatches of component values such as reference voltages and reduced output impedance variations in magnitude and phase even during various modes of operation. The shared bus power system connects an input voltage (10) to a load (12) through several parallel connected current-mode power stages (14a-14n). An input voltage (Vin) e.g. 28 V is converted to an output voltage (Vload) e.g. 123 V. Also connected to the parallel power stages (14a-14n) is the shared bus (20) forming a common control line for regulating all the current-mode power stages in tandem to provide near-identical output current distribution despite mismatches in component values without an additional complex current sharing control. The voltage regulation control circuit is further modified to select the error voltage (from lines 18, which is the common point) is then used as a common commanding control signal on a shared-bus connected to all of current-mode power stages. This control scheme regulates the output voltages of all parallel connected converters to the same voltage corresponding to the smallest or highest reference voltage within the converter system.

Documents D2-D4 represent the general state of the art.

A device according to claims 1-3 is known from document D1. Thus, the invention defined in claims 1-3 is not novel and consequently lacks inventive step. The invention is industrially applicable.